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G92-1121 Winter Deicing Agents for the Homeowner

Jay Fitzgerald

University of Nebraska, Lincoln (Agronomy and Horticulture Department), jfitzgerald2@unl.edu

Donald E. Janssen

University of Nebraska - Lincoln, djanssen2@unl.edu

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Winter Deicing Agents for the Homeowner

Information on deicers and how they affect plants is covered here.

Jay B. Fitzgerald, Extension Horticulturist
Donald E. Janssen, Associate Extension Agriculturist

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Slick sidewalks and roads are hazardous. Removing compacted snow and ice with shovels or snow blowers is not always an easy task. Deicers can help by "undercutting," or loosening the snow or ice because they lower the freezing point of water.

Do not use deicers to completely melt snow or ice, but to make their removal easier. Deicers melt down through the ice or snow to the hard surface, then spread out underneath. This undercuts and loosens the snow so shoveling and plowing can be done.

Research has shown that the shape of deicing particles affects the speed of their penetration through ice. Uniformly shaped spherical pellets of about 1/16" to 3/16" penetrate ice faster and more efficiently than other shapes. Irregularly shaped particles tend to melt randomly in all directions. Flakes melt as much horizontally as they do vertically.

There are five chemicals commonly used as deicers. While they can be used alone, they often are blended together or combined with other materials to enhance their performance.

Calcium chloride

Available in flakes, pellets or liquid. Calcium chloride produces an exothermic reaction, giving off heat. Because of this, it often performs better than many other deicing salts, especially at lower temperatures. Some highway departments spray liquid calcium chloride over rock salt to lower its melting temperature.

Sodium chloride

Rock salt first was used as a road deicer in the 1940s. An estimated 10 to 14 million tons will be used yearly on roads in the United States and Canada. Sodium chloride is relatively inexpensive, but it can burn plants and corrode metal and concrete. Sodium chloride is the salt most commonly used to season food.

Potassium chloride

A naturally-occurring material that also is used as a fertilizer (muriate of potash) and food salt substitute, potassium chloride's high salt index has the potential to burn foliage and inhibit rooting.

Urea

Synthesized from ammonia and carbon dioxide, urea is used primarily as a fertilizer. It has a lower burn potential than potassium chloride, and is a source of nitrogen fertilizer. Adjacent turf may green and grow excessively in the spring. If urea remains on top of the soil, it rapidly breaks down to ammonia, which escapes into the air.

Calcium magnesium acetate (CMA)

This is a new salt-free melting agent. It is made from dolomitic limestone and acetic acid (the principal compound of vinegar). CMA is being researched as an alternative to salts for environmentally sensitive areas. The product is being used on bridges sensitive to salt corrosion. Studies have shown the material has little impact on plants and animals.

Concrete paving, such as driveways, walks and steps may be damaged by deicing chemicals. The most common winter damage is scaling, which is caused by cycles of freezing and thawing caused by the deicing agent. Water can be absorbed into the very fine capillary space in the concrete. When it freezes and expands, small flakes of mortar and concrete come loose from the surface.

Concrete also can be damaged by the formation of salt crystals that have a similar effect as water freezing. To prevent freeze-thaw damage (scaling), make sure all concrete-paved surfaces are composed of air-entrained concrete and have proper cement content. Air-entrained concrete has minute air bubbles to increase resilience and resistance to wear. Strength also is important for a durable, scale resistant concrete. The concrete should be correctly cured; new concrete should be air dried for at least 30 days prior to the first freeze. Sealers may be applied to prevent the concrete from absorbing water and salts. Additional information pertaining to more specific questions on concrete may be addressed to: Portland Cement Association, Dept. Ne, 5420 Old Orchard Road, Skokie, IL, 60077.

Some deicing chemicals are more damaging to concrete surfaces than others. Products such as ammonium nitrate or ammonium sulfate tend to damage concrete more than sodium chloride or calcium chloride.

Improper use of deicing agents may cause injury to plants. Excess salts and fertilization from deicers impede uptake of nutrients. Plants cannot absorb sufficient water even when moisture is plentiful.

Symptoms of salt injury include desiccation, stunting and dieback. Leaf tips and margins appear burned. Roots may be injured.

Plants may be protected from injury by direct exposure to salt spray by covering them with burlap or saran cloth to decrease the amount of exposure to slush during snow removal. Accumulation of salt in

the soil over several years may cause progressive decline and eventual death of plants. Where deicing agents are used, flushing the soil with large amounts of water after the last freeze may alleviate burn potential. Always read and follow label directions when using any product, including deicers.

The following tables show arial salt spray (or *topical* salt tolerance) of landscape trees and shrubs.

For soil salt tolerance ratings, see designation after plant name:

(S)- Sensitive, (I) - Intermediate, (T) - Tolerant

Deciduous Trees

Sensitive	Intermediate	Tolerant
<i>Carpinus caroliniana</i> (S) American Hornbeam	<i>Acer ginnala</i> Amur Maple	<i>Acer platanoides</i> (I) Norway Maple
<i>Celtis occidentalis</i> Hackberry	<i>A. negundo</i> (I) Boxelder	<i>A. saccharinum</i> (I) Silver Maple
<i>Cercis canadensis</i> (I) Eastern Redbud	<i>A. rubrum</i> (S) Red Maple	<i>Aesculus hippocastanum</i> (T) European Horsechestnut
<i>Crataegus</i> spp. Hawthorn	<i>A. saccharum</i> (S) Sugar Maple	<i>Allanthus altissima</i> (T) Tree-of-Heaven
<i>Fagus grandifolia</i> (S) American Beech	<i>Alnus</i> spp. (S) Alder	<i>Elaeagnus angustifolia</i> (T) Russian olive
<i>Liriodendron tulipifera</i> (S) Tuliptree	<i>Amelanchier</i> spp. Serviceberry	<i>Fraxinus americana</i> (T) White Ash
<i>Malus</i> spp. (I) Crabapple	<i>Betula</i> spp. (I) Birch	<i>Gleditsia triacanthos</i> (T) Honeylocust
<i>Prunus serotina</i> (T) Black Cherry	<i>Catalpa speciosa</i> Catalpa	<i>Juglans nigra</i> (S) Black Walnut
<i>Quercus alba</i> (T) White Oak	<i>Fraxinus pennsylvanica</i> Green Ash	<i>Populus</i> spp. (I) Poplar
<i>Q. palustris</i> Pin Oak	<i>Pyrus</i> spp. Pear	<i>Robinia pseudoacacia</i> (T) Black Locust
<i>Q. rubra</i> (T) Red Oak	<i>Quercus macrocarpa</i> (T) Bur Oak	<i>Sorbus decora</i> Mountain ash
<i>Tilia cordata</i> (S) Littleleaf Linden	<i>Salix alba tristis</i> Golden Weeping Willow	
	<i>Tilia americana</i> (S) American Linden	
	<i>Ulmus americana</i> American Elm	

Shrubs

Sensitive	Intermediate	Tolerant
<i>Berberis thunbergii</i> (S) Japanese Barberry	<i>Alnus rugosa</i> (S) Speckled Alder	<i>Caragana arborescens</i> Siberian Peashrub
<i>Buxus sempervirens</i> (S) Common Box	<i>Berberis koreana</i> Korean Barberry	<i>Euronymus alata</i> (S) Winged Euonymus
<i>Chaenomeles speciosa</i> Flowering quince	<i>Forsythia x intermedia</i> Border Forsythia	<i>Juniperus chinensis</i> Pfitzer Juniper
<i>Cornus</i> spp. Dogwood	<i>Juniperus horizontalis</i> Creeping Juniper	
<i>Corylus</i> spp. (S) Hazelnut	<i>J.h. 'Plumosa'</i> (I) Andora Creeping Juniper	Philadelphia Mock orange
<i>Euonymus europea</i> (S) European Euonymus	<i>Liqustrum</i> spp. (I) Privet	<i>Rhamnus</i> spp. Buckthorn
<i>Sambucus canadensis</i> American Elder	<i>Lonicera</i> spp. (I) Honeysuckle	<i>Rhus aromatica</i> Fragrant Sumac
<i>Spiraea</i> spp. Spirea	<i>Syringa vulgaris</i> Common Lilac	<i>R.typhina</i> Staghorn Sumac
<i>Symphoricarpos orbiculatus</i> Indiancurrant Coralberry	<i>Viburnum dentatum</i> (S) Arrowwood Viburnum	<i>Kibes alpinum</i> Alpine Currant
<i>Viburnum lantana</i> (S) Wayfaringtree Viburnum	<i>V. lentago</i> (S) Nannyberry Viburnum	<i>Rosa rugosa</i> Rugosa rose
	<i>V. trilobum</i> (S) American Cranberrybush Viburnum	<i>Symphoricarpos albus</i> Snowberry
		<i>Syringa reticulata</i> Japanese Tree Lila
		<i>Tamariz ramosissima</i> Five-stamen Tamariz

Coniferous Trees

Sensitive	Intermediate	Tolerant
<i>Abies balsamea</i> (I) Balsam Fir	<i>Juniperus</i> spp. Juniper	<i>Juniper virginiana</i> Eastern Redcedar
<i>Metasequola glyptostroboides</i> Dawn Redwood	<i>Picea abies</i> (S) Norway Spruce	<i>Larix decidua</i> (S) European Larch
<i>Picea glauca</i> (I) White Spruce	<i>Pinus ponderosa</i> (I) Ponderosa Pine	<i>Picea pungens</i> (S) Colorado Spruce
<i>Pinus resinosa</i>	<i>Pseudotsuga menziesil</i> (S)	<i>Pinus banksiana</i>

Red Pine	Douglas fir	Jack Pine
<i>P. strobus</i> (S) Eastern White Pine		<i>P. nigra</i> Austrian Pine
<i>P. sylvestris</i> Scotch Pine		
<i>Taxus</i> spp. Yew		
<i>Thuja occidentalis</i> (I) American Arborvitae		
<i>Tsuga canadensis</i> (S) Canada Hemlock		

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